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BROOKHAVEN NATIONAL LABORATORY PROCESS ASSESSMENT FORM

I. General Information

Process ID:	PO-583-SSO			
Process Name:	Staff Shop Operations			
Process Flow Diagrams:	PEP583dwg			
Process Description:	<p>This process includes the Staff Shop Operations located in Building 510 at BNL and managed by the Physics Department. The operations include the machining of various materials. There are several staff shops that contain metalworking machines for small to medium scale fabrications, modifications, repairs and maintenance of laboratory parts and equipment. The machines utilized in the staff shops include lathes, saws, grinders, sanders, drill presses, milling machines and buffers. Soldering and brazing and a small amount of painting are also done in some of the shops. The above Process Flow Diagram provides more detail on the Staff Shop Operations.</p> <p>The significant environmental aspects associated with these operations are industrial and hazardous wastes.</p> <p>Also, relevant subject areas include pollution prevention, industrial and hazardous waste, liquid effluents, the "Working With Chemical" SBMS Subject Area, the non-rad air emissions, and Spill Response. Additionally, see Appendix A for BMP-Cold Cleaning Operations.</p>			
Dept./Div.:	Physics			
Dept. Code:	PO			
Building(s):	510			
Room(s):	1-120, 1-121, 1-124, 1-141, 1-144A, 1-151, 1-210, 1-228, 1-236, 2-86 and 2-233			
Point of Contact:	R. Gill	x3987		
Prepared by:	S.Ferrone	Reviewed by:	R. Gill	M. Zarcone
Approved by/ Date:	R. Gill, EMS Rep.			5/27/04

I. SIGNIFICANT ENVIRONMENTAL ASPECTS ASSOCIATED WITH THIS PROJECT:

For criteria, go to SBMS Subject Area titled Identification of Significant Environmental Aspects and Impacts

a	Industrial Waste Generation		Atmospheric Emissions	Historical Monuments/Cultural Resources	TRU Waste Generation
a	Hazardous Waste Generation	X	Liquid Discharge	Sensitive/Endangered Species and Sensitive Habitats	
	Radioactive Waste Generation		Storage or Use of Chemicals or Radioactive Materials	Env. Noise	Other Regulatory Requirement
	Mixed Waste Generation		Water Consumption	Historic Contamination (groundwater/soil)	
	Medical Waste Generation		Power Consumption	Soil Activation	

APPLICABLE REGULATORY REQUIREMENTS:

BNL **Subject Areas** that are applicable to this process:

++PI's should consider subscribing to the subject area subscription service as a means of staying informed of changes to the subject area requirements.

	Drinking Water		Radioactive Waste Management
	Environmental Monitoring		Regulated Medical Waste Management
X	Hazardous Waste Management	X	Spill Response
X	Liquid Effluents		Storage and Transfer of Hazardous Materials
	Mixed Waste Management	X	Transfer of Hazardous Materials On-Site
	National Environmental Policy Act (NEPA) and Cultural Resource Evaluation	X	Transfer of Radioactive Materials On-Site
X	Non-Radioactive Airborne Emissions		Transportation of Hazardous Materials Off-Site
	Oils/PCB Management		Transportation of Radioactive Materials Off-Site
X	Pollution Prevention and Waste Minimization		Underground Injection Control
	Radioactive Airborne Emissions		
X	Industrial waste		

II. Detailed Process Descriptions and Waste Determination

This process includes the operations of the Physics Staff Shops (PSS) located in Building 510 at BNL and managed by the Physics Department. The PSS shops contain various metal and sheet metal working machines. The metal working machines include spot welders, milling machines, drill presses, buffing wheels, sanders, grinders, lathes and saws. Section II and the associated drawing - Process Flow Diagram provide more detail on the PSS. The primary focus of the Physics staff shop is the small to medium scale fabrications, modifications, repairs and maintenance of laboratory parts and equipment. Etching of crystals was formerly done in Room 1-124 and utilized nitric and hydrochloric acids, but is no longer performed.

The PSS utilize many different materials to fabricate parts depending upon part specifications, including carbon steel, tool steel, stainless steel (300s and 400s), aluminum, brass, copper, bronze, titanium, molybdenum, tungsten, and plastics. There is a metal cutting machine located in room 1-141. This machine cuts the metal with an abrasive wheel, generating dust that is vented by a trunk to the outdoors. This saw was formerly a NYS Dept. of Environmental Conservation (NYSDEC) permitted emission, BNL# 51002/032000350, for cutting brass,

stainless steel and aluminum. However, as BNL now has a site-wide, Title V Clean Air Act Permit and this emission point is part of this permit envelope (see http://www.dec.state.ny.us/website/dar/boss/afs/permits/147220003200115_0.pdf), the above local permit is no longer applicable. Scrap metal and machine cuttings are transported to Central shops where they are stored in metal containers for pick up by a NYS Part 360 permitted recycler.

A general description of the machining operations is provided below:

The material or part to be used for fabrication is placed on a machine. Most machines require various lubricants (e.g., lubricating oil, spindle oil, etc.) in order to operate properly. These oils are replenished and changed-out periodically. A tool (e.g., cutter, drill bit, saw blade, grinding wheel, etc.) is placed in the machine. Any required cleaning agents, cutting oils, inks or dyes are applied to the material. On some machines, coolant is sprayed on the tool and the material to prevent the tool from overheating. Paper rags are used to wipe any oils or chemicals from the machine and/or part. The metal cutting machine generates dust during use and is equipped with a vent that exhausts small particulate matter (permitted emission point). When machining is complete, the finished part is brought back to the original lab. Metal scrap is transferred to the metal drums for recycling. Metal shavings are placed in the trash. Worn machine tools are placed in the chip bins (if entirely metal) or discarded in regular trash (i.e., grinding or cutting wheels). Any spent absorbent socks and paper rags are drummed and transported to the 90-day area for disposal as industrial waste (see [Industrial Waste](#)).

Chemical usage and waste generation within the Building 510 staff shops is similar to other staff shops at BNL. The Building 510 staff shops are listed in the BNL Chemical Management System (CMS): [Chemical Management System](#). The SBMS Subject Area [Working With Chemicals](#) is also utilized. Staff shop operations do not typically generate hazardous waste based on information provided in the Waste Management database for Building 510. Solid waste (other than rags) generated within the staff shops is discarded in the trash or recycled off-site (metals only). Wastewater from the sink within the staff shops is discharged to sanitary. Occasionally, some non-empty aerosol cans containing flammable propellant are generated in the shops.

The use of small laboratory-scale ultrasonic cleaners is infrequently used for the cleaning/degreasing of machined parts both in the Staff Shops and inside the labs. The solvents used are either environmentally friendly ones not containing listed solvents or they could be common lab chemicals such as acetone, methanol, IPA (isopropanol) or other chemicals with low toxicities. The NYS Dept. of Environmental Conservation (NYSDEC) has granted an exemption for those cleaners that contain “volatile chemicals (e.g. methanol) as defined by the NYSDEC under the BNL Title V Clean Air Act and they have recommended that a set of basic best management practices (BMPs) are followed (see Appendix 1). These BMPs do not apply to the cleaners that use low-volatility cleaners (e.g. Zephride).

Regulatory Determination of Process Outputs



1.0 Building 510 Staff Shops






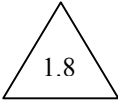
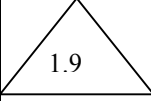
The shops do not contain any machines that have an integral coolant system with the exception of a cut-off saw that uses a water-soluble coolant. During machining, coolant is manually sprayed on the parts and machine tools to prevent the tools from overheating. Some of the coolant vaporizes during use and is released to ambient air. Lubricants may also be applied to the parts during machining (e.g., cutting oil) and are also used for machine operation and maintenance (e.g., spindle oil). Paper rags and cleaners are used to wipe the parts (and equipment) clean following machining. Spent rags and empty containers used to be discarded in the regular trash. The rags are now collected as industrial waste and the empty containers are evaluated for recycling.

The 1-141 shop's two grinders are equipped with their own dust collection systems, which capture dust and particulates generated during machining. The dust collection system draws the dust-laden air through a furnace type filter and exhausts the air stream to ambient air. Dust removed by the filter is discarded in the regular trash. It is unknown when the dust filter was last replaced. Disposal of the filter should be similar to the disposal method utilized for the metal chips. Based on testing performed at the Central Shops and the HFBR staff shop using similar equipment, it was found that the metallic dust and these filters test were non-hazardous (Reference COC# 99090103).

A shop-vac is utilized to collect metal chips and shavings from the floor as well as the machines. Metal chips and scrap are placed in a metals recycling container, collected by BNL and then transported off-site by a contractor for recycling. Shavings and non-metal scrap are discarded in the regular trash.

Non-empty aerosol cans containing ignitable propellant are infrequently generated but are handled as hazardous waste as per: [Hazardous Waste Management](#).

Waste ID	Waste Description	Determination/Basis	Waste Handling	Corrective Action Required
	Vaporized coolant	Non-hazardous vapors as determined by process knowledge	Vapors are released to ambient air	None
	Spent rags (paper towels)	Non-hazardous solid waste as determined by process knowledge	This material is now collected for disposal as an industrial waste	None

Waste ID	Waste Description	Determination/Basis	Waste Handling	Corrective Action Required
 1.3	Empty containers, shavings and non-metal scrap	Non-hazardous solid waste as determined by process knowledge	Waste is discarded in the regular trash	None
 1.4	Metal chips, broken and worn tools	Non-hazardous solid waste as determined by process knowledge	Waste is collected by BNL for off-site recycling	None
 1.5	Dust from belt sander and grinders and filters	Non-hazardous solid waste as determined by similar samples	Waste is discarded in the regular trash	None
 1.6	Non-empty aerosol cans	Propellant is ignitable	Waste is handled as hazardous and given to 90-day area mgr.	None
 1.7	Wash water from sink	Non-hazardous liquid waste as determined by process knowledge	Wastewater is discharged to the sanitary sewer	None
 1.8	Uncollected particulate	Non-hazardous particulate and dust	Vented to ambient air	None
 1.9	Volatiles from spray cleaners	Non-hazardous vapors as determined by process knowledge	Vapors are released to ambient air	None

III. Waste Minimization, Opportunity for Pollution Prevention

1.0 Building 510 Staff Shops

During machining operations, the machine and parts are wiped with paper rags to remove any remaining coolant or lubricant. The Physics Department has recently implemented a program to collect spent paper rags for disposal as an industrial waste. Waste rags are discussed in more detail in the CSD-132-MSO (Central Shops process assessment for Machine Shop Operations). Potential waste minimization alternatives include utilizing a squeegee or cloth rags provided by a

laundrying service instead of disposable paper rags. On 5/4/00, the ECR team evaluated this option. Based on life cycle assessment risk/benefit considerations, they concluded that laundrying was not a preferred option for reducing this waste stream.

Cleaners are applied to the parts and machines utilizing plastic spray bottles or aerosol cans. Empty bottles are discarded in the regular trash. Cleaner containers are discussed in more detail in the CSD-132-MSO (Central Shops process assessment for Machine Shop Operations). Potential waste minimization options typically include purchasing chemicals and cleaners in bulk or concentrates and utilizing refillable plastic spray bottles instead of disposable spray bottles and aerosol cans. The Physics Department only uses small amounts of chemicals. Central Shops is currently evaluating alternate cleaners. Upon selection, the Physics Department should evaluate changing to this cleaner (i.e.. Simple Green) and can purchase it in small reusable or recyclable spray bottles (bulk purchasing not advisable due to low usage). The Physics Department may be able to purchase concentrated cleaners that are diluted and distributed in spray bottles. Empty aerosol cans are a candidate for the recycling program.

Summary of Pollution Prevention Opportunities		
Process ID	Waste Stream ID	Potential Pollution Prevention Measures
Various machines	1.3	Recycled through EP Dept. Scrap Metal Program.
Various machines		Investigate the feasibility of purchasing alternate cleaners as discussed above.- Central Shops uses non-hazardous ZEP cleaner (no volatiles). Researchers infrequently use cleaners.

IV. Assessment Prevention and Control

1.0 Building 510 Staff Shops

The machines in the staff shop do not have spill pans or mats beneath them to contain any liquids that may spill or leak during operation. Spill pans or mats could be placed under the machines that utilize machine oils and coolant. If the machine is too large or too heavy to lift, a spill berm could be installed around the perimeter of the machine. Any spilled liquid collected within the spill pan or berm would be transferred to a drum for disposal. This is feasible in the larger staff shop. The smaller shops may find it more practical to store a spill cart nearby.

Prevention Assessment and Control Initiatives		
Process ID	Waste Stream ID	SOP, Inspection or other APC Measures Recommended
Various machines	Spilled liquids	Place spill pans, mats or berms around machines to prevent spilled oil and coolant from being released to the room in larger shop (1-141). Place spill kits in or nearby smaller shops.

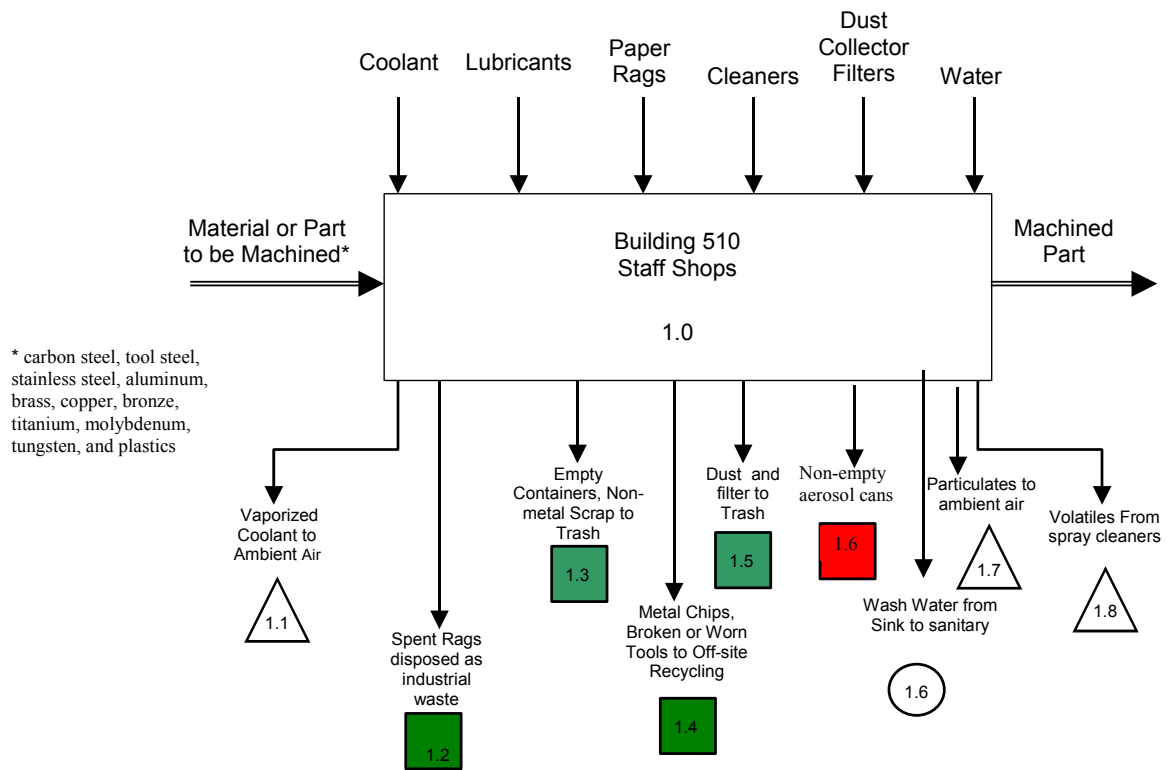
ATTACHMENT 1

Best Management Practices for the cold cleaning operations throughout Bldg. 510
(volatile cleaning solvents only):

- Cover the ultrasonic cleaners when not in use and use the cleaner inside a lab hood.
- Periodically check the ultrasonic cleaners to make sure they are not leaking.
- Store cleaning products in covered containers.
- Keep a written record of the cleaning product types, dates and volumes purchased.
- Keep a written record of the cleaning product types, dates and volumes disposed as hazardous wastes.
- Maintain the above records for five years.
- If wastes were derived from a diluted original solution, note the dilution factor.

ATTACHMENT 2

Non-Empty Aerosol Cans



**Physics Department – Staff Shop Operations
Process Flow Diagram**

PO-583-SSO-01